

THE HISTORY OF INDIAN MAMMALOGY AND ORNITHOLOGY

BY

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PART I. MAMMALS

(With three plates)

The study of mammals in India in the first half of the last century owes more to Brian Hodgson and Edward Blyth than any other naturalist. Hodgson's work in Nepal and Sikkim laid the foundation of our knowledge of the mammalian fauna of the great Himalayan chain, while Blyth, owing to his facilities as curator of the museum of the Asiatic Society, had a wider influence since he had at his disposal specimens from the whole of India, Burma and Ceylon, as well as Afghanistan and the Malay Peninsula.

But before either of them had arrived in India Major-General Hardwick, head of the Bengal Artillery, had for many years collected specimens and employed native artists to make coloured drawings of them. He described a number of species, such as the Goral (*Naemorhedus goral*) and the Indian Gerbil (*Tatera indica*), but he was forestalled in his description of the Gaur and Four-horned Antelope. In 1815 Dr. Wallich, superintendent of the Calcutta Botanical Garden, went to Nepal to collect plants and seeds. He was a great friend of Hardwick and sent him a number of mammals, birds and many insects. Some of the mammals Hardwick described himself, while others he presented to the British Museum, the Zoological and the Linnean Societies. Hardwick seems to have been unfortunate in his dealings with the last named society, since according to the minute book for 1821 a description of the Panda (*Ailurus fulgens*) was communicated by General Hardwick and read in his absence, but never published. Again in 1823 his communication on the 'tail-less deer' *Cervus wallichii* and the sheep '*Ovis argali*' (= *Ovis hodgsoni*) met the same fate!

Hardwick returned to England in 1823 and some years later commenced publishing, in conjunction with Dr. J. E. Gray of the British Museum, the well-known 'Illustrations of Indian Zoology' (1830-1835).

In 1844 Dr. John McClelland in writing a review of Belanger's 'Voyage aux Indes Orientales' (1838) remarked 'We wish our own Government would take a lesson from the French, who seeing the interest of science neglected in the colonies of other rival nations, with an enlightened policy peculiar to the French, dispatched their own philosophers to supply desiderata'. Before giving a brief account of the important work the French did in India, it is well to remember that one Governor-General—Lord Wellesley—did attempt to set up an institution for the study of natural history in the beginning of the nineteenth century. The scheme was to establish a college at Fort William and attached to it a natural history establishment at

Barrackpore where animals and birds were to be kept and studied. Orders were sent to officials in all parts of the Company's territories to send in live animals to Barrackpore. Dr. Francis Buchanan was appointed to take charge of the institution and undertake the official study of Natural History in India. Between 1800 and 1804 many animals reached Barrackpore, but Lord Wellesley's successor took little interest in the scheme; the institution degenerated into an indifferent zoological garden and gradually came to an end.

McClelland's remarks about the French were, however, quite true and one of their earliest travelling naturalists to visit India was Jean Baptiste Leschenault de la Tour, who arrived in Pondicherry in September 1816 to take charge of the Royal Botanical Gardens there. He travelled and collected widely in South India and visited Salem, the Nilgiri Hills, the French possessions on the west coast and then went south to Cape Comorin from where he crossed over to Ceylon. He returned to France in 1826. A year after Leschenault's arrival Pierre Medard Diard reached Chandernagore, where he was joined by Cuvier's step-son Alfred Duvaucel. These two naturalists accompanied Sir Stamford Raffles's expedition to Java in 1818-19. Diard went on to Sumatra and Indo-China and in 1825 joined the Dutch administration at Batavia. Between 1820 and 1825 he sent specimens to Paris but thereafter all his collections were sent to Leyden. He died at Batavia in 1863. Duvaucel parted from Diard in 1820 and went to Pedang and then returned to Chandernagore. From there he went to Sylhet and apparently visited the Khasia Hills, from where he returned to Calcutta in bad health and died in Madras in 1824. While at Chandernagore he visited General Hardwick at Dum Dum and made drawings of a four-horned antelope the general had alive. He also studied and made sketches of the animals at Barrackpore including the tail-less deer (*Cervus wallichii*), which had been sent from Nepal. Two of his native collectors he sent to Katmandu where they worked under Hodgson. About the same time a captain in the French mercantile marine, by name Dussumier, was very active in collecting specimens at many ports of call, which naturally were for the most part in the French possessions.

The specimens these naturalists collected were sent home to Paris where they were described by the Cuviers, Geoffroy, Blainville and others and included *Rousettus leschenaulti*, *Semnopithecus dussumieri*, *Cervus leschenaulti* (= *Cervus unicolor niger*) and *Cervus duvauceli*.

Four years after Duvaucel's death Victor Jacquemont arrived in Calcutta and remained in India some four years. He seems, however, to have been more of a traveller, and a very observant one, than a collector. In the course of his journeys he visited Delhi, the Himalayas, the Punjab and Kashmir from where he returned to Delhi and then went south to Bombay via Indore and Ajmere. He had intended continuing down the ghauts to Pondicherry and Ceylon, but he was taken ill and died in Bombay on 7th December, 1832. Jacquemont collected few mammals and though he described several the only name given by him which stands is that for the long tailed marmot *Marmota caudata*. More successful, however, was Charles Belanger, who reached Bombay in 1825 after a journey overland from

France. He travelled south to Malabar and then crossed the peninsula to Pondicherry from where he went to Calcutta. Thence he sailed to Pegu and after doing some collecting there he proceeded further south to Java and then returned to Pondicherry on his way home. He discovered several mammals such as the Rusty-spotted Cat (*Felis rubiginosa*) near Pondicherry and *Melogale personata* the Burmese Ferret-badger and the Tree-shrew *Tupaia belangeri*, both near Rangoon. The last French travelling naturalist is Adolphe Delessert, who came out to Pondicherry in 1834, but as he was more interested in birds than mammals details will be given under that section.

In October 1824 Captain W. H. Sykes of the Bombay Army was appointed statistical reporter to the Bombay Government and for the next seven years was engaged in this work. He wrote two large statistical reports on the Deccan and while gathering information on the subject also collected natural history specimens of all orders, which he gave to the Company's Museum in London in 1831. In the same year he published in the *Proceedings of the Zoological Society* a paper on the mammals in which he described the Indian Wolf *Canis pallipes*, the Wild Dog *Cuon dukhunensis*, the Indian Gazelle *Gazella g. bennetti*, and a number of others. In all he listed thirty-nine species with some information on their distribution and habits.

A deputation in 1839 was sent to study the tea plant in Assam. The party consisted of Dr. Wallich, Dr. William Griffith both botanists, and Dr. John McClelland, a geologist who was interested in natural history generally, especially fishes. They visited the Khasia Hills and McClelland made a collection of mammals and birds, which were despatched to the Company's Museum on the return of the deputation. With the assistance of Dr. Horsfield, the Keeper of the Museum, McClelland wrote a paper on his collections in the *Proceedings of the Zoological Society* for 1839. Of the nineteen different species collected the Macaque *Macaca assamensis* and the Giant Squirrel *Ratufa gigantea* were among his four new discoveries.

Sir Walter Elliot, better known as an archaeologist than a zoologist, served some seven or eight years in the Southern Mahratta country, now known as the Dharwar district. In 1839 he published in the *Madras Journal of Literature and Science* a 'Catalogue of the species of mammalia found in the Southern Mahratta country'. This paper was far in advance of any previously published on Indian mammals. Fifty-eight species are given with detailed descriptions and very good notes on habits and distribution. All this goes to show that Sir Walter was a very close observer and had he continued his studies no doubt he would have become one of the leading naturalists in India. In his introduction Elliot divides the various species into five categories, according to where they are found, as follows: (1) 'Common to all parts of the country where they are found', (2) 'Mountain forest', (3) 'Mulnad or rain country', (4) 'Black plain', (5) 'Sandstone and red soil'. Surely this paper must be one of the fore-runners of the study of animal ecology! Many years later Elliot sent to the British Museum the skulls of several cetaceans obtained at Vizagapatam, together with notes of the colours of the fresh animals. These were described by Sir Richard Owen in a paper published in the *Transactions of the Zoological Society* for 1866.

Brian Hodgson went to Nepal as assistant to the Resident at Katmandu in 1820 and, with the exception of a break of eighteen months remained there till 1843. During the last ten years of his service he was Resident. Throughout his service he employed hunters to shoot and trap mammals and birds and every specimen which they brought to him was carefully measured, weighed and described. In addition he had one or two artists who made careful drawings of the feet, ears, etc., while fresh, and in some cases of the whole animal also. Skulls were always taken out and attached to the skins and sometimes entire skeletons were preserved, or at least parts of them. The weak point in Hodgson's collecting was his labelling of the specimens. Either no label was attached to the skin, or merely the name of the animal on native paper. In this Hodgson was not alone; few collectors in those early days realized the necessity for careful labelling. Nevertheless Hodgson brought together a remarkable collection and so far no important addition has been made to his Nepal list. One of the first animals he described was the serow which he named *Antelope thar* in 1831, and in the following year appeared his first catalogue in which twenty species are recorded by name but there are many others he was unable to identify¹. His final catalogue published by the British Museum in 1846 records one hundred and fifteen species, including some ten or so from Tibet. It was owing to Hodgson's friendship with Bhim Sen, the Prime Minister of Nepal, that he was enabled to get specimens from Tibet and ultimately to send his own men there. It has often been said, and quite correctly too, that Hodgson described many of his species on unsatisfactory characters or too small material and also that he was always in a hurry to get priority. This last suggestion is not true since over and over again we read in his papers that he has known a certain animal for years but delayed describing it till he had further examples. In 1843 Hodgson left Nepal and came home to England but two years later he returned to India and lived at Darjeeling till he finally left India for good in 1858. The most remarkable animal which Hodgson named was the Takin. In 1846 a Major Jenkins, the Governor-General's Representative in Assam, sent him an imperfect specimen which was followed two years later by good examples of both male and female. It was while he was living at Darjeeling that Hodgson wrote his important paper on the 'Physical Geography of the Himalayas' in which he divided that mountain range into three altitudinal areas and described the animals inhabiting each.

When Dr. McClelland in 1840 started the *Calcutta Magazine of Natural History* among the contributors to the first number was a young officer of the 31st Bengal Native Infantry, in civil employ, stationed in the wild district on the south west border of Bengal.

¹ In a footnote Hodgson writes: . . . 'My shooters were once alarmed in the Kachar by the apparition of a 'wild man,' possibly an ourang, but I doubt their accuracy. They mistook the creature for a cacodemon, or rakshas, and fled from it instead of shooting it. It moved, they said, erectly; was covered with long dark hair, and had no tail.'

Here we have an early reference to the animal which has been exercising the minds of climbers in the Himalayas and zoologists who have never seen India!

This was Lt. R. S. Tickell, one of the best field naturalists India has known. His contributions included papers on the sloth bear, brown flying squirrel and anteater, and when he was stationed in Tenasserim he wrote a very good account of the habits of the gibbons. At one time Tickell intended to publish a book on Indian mammals and birds, but although his manuscript, and illustrations by himself, were all prepared, it was never published and is now carefully preserved in the library of the Zoological Society in London. When Blanford wrote the 'Mammals' he made frequent use of Tickell's MS.

When the first Afghan war broke out in 1838 Lt. Thomas Hutton of the 37th Native Infantry joined the army of the Indus but was soon transferred to the 'Pay and Commissariat Department of Shah Soajah's forces' and bitterly complained that he had no time to get about. All the same he somehow or other did a good deal of collecting and wrote interesting notes on the Sind Ibex, Markhor and Urial; the last two he also named and described. In addition he sent some smaller mammals to Blyth for identification and, after the war, published a paper in the *Jour. Asiat. Soc. of Bengal* (1845) 'Rough notes on the Zoology of Afghanistan'. Hutton later was in charge of the 'Invalides' at Mussoorie where he continued his natural history studies and at one time was said to be writing a popular account of the Mammalia of the north western Himalayas, but it was never published.

In September 1841 Edward Blyth arrived in Calcutta to take charge of the Museum of the Asiatic Society. Before long he was in touch with many naturalists in India and the neighbouring countries and large numbers of specimens of many orders began to come to the Society. First and foremost of these correspondents was Dr. Jerdon, who became a great personal friend, then there was Col. Phayre, afterwards first Commissioner for Burma, and Major Birdmore, both stationed in Tenasserim where too was Ossian Limborg. The well-known Roman Catholic Missionary the Reverend J. Barbe sent specimens from the Tipperah Hills, Tenasserim and the Nicobars; Captain Hutton and Dr. Stewart from Mussoorie, Captain Tickell, Chaibassa, and Dr. Kelaart and E. L. Layard from Ceylon. R. W. Frith of Jessore made several trips for the Society to Cherrapunji and brought back many interesting specimens. Blyth was a man of great energy and in addition to carrying out his museum duties it was his custom to prepare reports for the monthly meetings of the Society of the accessions received since the last meeting. This was no mere list of specimens but a detailed account in which new specimens were described and attention drawn to others whether little known or new to the collection of the Society. Not infrequently he read a paper at these meetings and his choice of subjects was very wide, ranging from the 'Rats and Mice of India' to the 'Great Rorqual of the Indian Ocean'. Blyth had a remarkable memory, was very well read, and anything he wrote generally contained some out of the way information. On account of continued ill health he had to retire in 1862 and return to England, but not before he had finished the catalogue of the Mammals in the Society's collection, which his friend Jerdon saw through the press for him.

Dr. Kelaart, Blyth's correspondent in Ceylon, was in the Army Medical Service and when on leave in England had been persuaded



Samuel Richard Tickell
Died 1865



Thomas Caverhill Jerdon
1811-1875

(Reproduced from "The Nests and Eggs of Indian Birds" by A. O. Hume, 2nd edn.)



Brian Houghton Hodgson
1800-1804



Edward Blyth
1810-1872

by the head of the Medical Service Dr., afterwards Sir Andrew, Smith, to take up the study of natural history. In 1850 he published in the *Proceedings of the Zoological Society* 'A Catalogue of the Mammals of Ceylon' enumerating 58 species, and two years later his well-known 'Prodromus Faunae Zeylaniae' appeared. In the introduction to his work he remarks 'our own labours would, like those of many collectors, have been in a chaotic mess, but for the assistance of cabinet investigations of such eminent men as the Grays and Blyth'.

On 18th May, 1849 the 22 Foot—the Cheshire Regiment—landed in Bombay, crossed the harbour and marched over the ghauts to Poona. Their medical officer was A. L. Adams, who later became professor of zoology in Cork, a very keen and observant naturalist. Adams served with the regiment for seven years at Poona, Karachi and Rawalpindi and while at the last station made expeditions into the Himalayas and to Kashmir. In a paper in the *Proceedings of the Zoological Society*, 1858, he described the habits and distribution of the different mammals he had met with during his stay in India, and some nine years later published an interesting book entitled 'Wanderings of a Naturalist in India'.

In 1867 Jerdon's 'Mammals of India' appeared and for the next twenty-one years it was the standard book till replaced by Blanford's volume. Though confined to the animals found in Kashmir and the Indian peninsula, he frequently referred to species in Assam, Burma and Ceylon. In his introduction Jerdon admits that the portion of the work dealing with the small shrews, bats and rodents was very imperfect and this was not to be wondered at as the only collection he could refer to was the Asiatic Society's in Calcutta and many of the species described by Hodgson and Gray were not represented there. Then, too, he had to rely to a great extent on his own observations on the habits of animals, since little had been published except in the papers of Sykes, Elliot, Tickell and Hutton. Nevertheless the book filled a great want and Jerdon's own notes were excellent. In England Doctors Horsfield and Gray had been making known many new animals from India, principally collected by Hodgson, who continued to send consignments to both museums. The 'Catalogue of Mammals in the Museum of the East India Company' appeared in 1851 and two years later Hodgson sent his final donation to the Company's museum, which Horsfield described in the *Annals and Magazine of Natural History* (1855). This was an important paper and besides descriptions of new and little-known species there were notes on all the additions to Gray's 'Catalogue of the Mammals and Birds of Nepal' published ten years earlier. At the beginning of the paper Horsfield mentions that this consignment included a large supply of Indian ungulata, but except for the takin he makes no mention of them.

The year 1845 was an important one in the study of zoology in India since in that year W. T. Blanford arrived in India to join the Geological Survey. In addition to being an accomplished geologist, Blanford was a zoologist with wide interests and wrote many papers, not only on mammals but also on birds, reptiles and mollusca. He was concerned with the agitation which ultimately induced the Government of India to establish a museum in Calcutta, and there is

little doubt but that he had much to do with the memorial which persuaded the Secretary of State for India to sanction the series of volumes known as the Fauna of British India, of which he was the first editor and author of four volumes. While engaged in geological field work Blanford had ample opportunities for collecting and seeing live animals, and when the staff of the Survey worked in Calcutta during the rains he devoted his spare time to studying the collections in the museum. He wrote many papers on mammals and one of his most important was the mammal portion of the 'Scientific Results of the Second Yarkand Mission' (1878). The specimens brought back by the expedition were collected by a young Austrian geologist on the staff of the Geological Survey named Ferdinand Stoliczka, who died on the way home when crossing a high pass¹.

Previous to this expedition little was known about the mammals of Kashmir, except the game animals and a short account in the fourth volume of Baron von Hugel's 'Kaschmir und Reich der Sikk' (1840). Blanford's paper may therefore be said to be the basis of all future work on this region. During the next twenty years or so several officers stationed in Kashmir and adjacent agencies did good work in making known the local fauna, such as Biddulph and Scully in Gilgit, Macmahon—afterwards Sir Henry and founder of the Baluchistan Natural History Society—in Dir and Swat, Fulton in Chitral and at a much later date Colonel Stockley in various parts of Kashmir. During the first ten years of the present century Major Dunn, Colonel Magrath and Captain Whitehead collected in Hazara and the North West Frontier Province and helped to enrich the collections of both the Society and the British Museum. Between 1891 and 1894, Dr. W. L. Abbott, an American of independent means, who spent most of his life travelling and collecting for the Smithsonian Institution in the East Indies and East Africa, visited Kashmir on two occasions. On the second of these visits he travelled north as far as the Tian Shan following the same route as the Yarkand expedition. His collections were reported on in the *Proceedings of the U.S. National Museum*. It was not, however, till Colonel Ward of the Kashmir Game Department began to collect that the mammals of Kashmir became properly known. At first Ward collected himself, but latterly engaged C. A. Crump to come out from England and collect both mammals and birds. From time to time Ward sent short papers to the *Journal* giving the identifications of the specimens he had sent to the British Museum. In the first of these papers he quotes from a letter he had received from Oldfield Thomas dated September 1904 as follows,—'I doubt if you realize that we have no specimens except yours of the commonest Kashmir species or indeed of India generally (except from Wroughton) and these we have moreover without the date, measurement etc. that nowadays make the chief value of specimens'. It is much to be regretted that no general account of the mammals collected by Col. Ward was ever published.

During the Afghan Delimitation Commission in 1896 Dr. Aitchison the official naturalist, and Colonel Yate, a member of the Commission,

¹ Stoliczka was buried in Leh. A photograph of his tomb is published at p. 656 of Vol. 32 (4) of the *Journal*.—EDS.

both made collections of mammals which were described in the *Transactions of the Linnean Society* and in the *Journal of the Asiatic Society*. When Colonel Younghusband's Mission went to Lhasa in 1904 Captain Walton, I.M.S., was attached as doctor and naturalist. He got together a small but interesting collection of mammals, some of which were collected in the same localities that Hodgson's men had procured the originals sixty-three years previously.

Not long after Blyth left India the Government decided to build a museum in Calcutta and in September 1866 Dr. John Anderson was brought out from home to be the curator. During his term of office he did much to increase the collections and in this he was helped by Dr. G. E. Dobson, an army doctor interested in bats, who besides writing many papers also wrote a monograph of the Asiatic Chiroptera (1876) which was based on the Museum's collections. Anderson did a considerable amount of collecting himself, accompanied the two Yunnan expeditions in 1868 and 1875, and at a later date went to the Mergui Archipelago. The collections made on the Yunnan expeditions were described in a special volume entitled 'Anatomical and Zoological Researches' (1878) and included an important memoir on a new river dolphin *Orcella fluminalis* captured in the Irrawaddy during the first expedition. Sir Arthur Phayre, the first Governor of Burma, a great friend of Blyth's and donor of many specimens to the Asiatic Society's Museum, had asked Blyth to write a general account of the mammals and birds of Burma. This Blyth was engaged in at the time of his death in 1873. The Asiatic Society later published the account in a special number of their journal along with a short life of Blyth. The mammal portion was revised by Anderson and Dobson, and the birds by Viscount Walden.

Between 1885 and 1887 Leonardo Fea of the Genoa Museum visited Burma and made extensive collections in all branches of natural history in the Bhamo district of upper Burma, and in Karennee and Tenasserim. The mammals were described by Oldfield Thomas in the *Ann. Mus. Genova* (1892).

In 1846 the missionary, the Rev. P. Barbie, S.J., wrote an account of the Nicobar Islands in the Asiatic Society's journal to which Blyth added a natural history appendix. Eleven years later the islands were visited by an Austrian scientific expedition in the frigate 'Novara' and considerable collections made. Towards the end of the mutiny Dr. Mouat was sent to the Andaman Islands on behalf of the government to report whether the islands would be suitable for a convict settlement and in 1863 he published an account of his visit in 'Adventures and Researches in the Andamans' with an appendix on the natural history by Blyth. It was not, however, till 1901 that the mammalian fauna of the two groups of islands was properly investigated. In that year Dr. Abbott accompanied by C. Boden Kloss, who afterwards was on the staff of the F.M.S. Museums, made a comprehensive tour of both the Andamans and Nicobars and collected a series of specimens which were described by Geritt Millar in the *Proceedings of the U.S. National Museum*.

The name of A. O. Hume is generally associated with the study of Indian birds, but he was also interested in big game and presented to the British Museum his collection of over a hundred heads and

horns. In 1874 he described in the *Proceedings of the Asiatic Society of Bengal* the race of the Ibex from the Sind hills and of the Markhor inhabiting the Suleiman range. Two years later Major Sandeman, the famous frontier officer, sent him an Urial from Baluchistan which he named after Blanford. Hume also had a collection of mammal skins amounting to 400 specimens collected by his own men and some of his correspondents. This collection was presented to the British Museum in 1886.

Many different kinds of rats and mice had been described by Gray, Horsfield, Hodgson and others on various occasions, but it was exceedingly doubtful if they were all good species. This uncertainty was cleared up in 1881 by Oldfield Thomas who, in the *Proceedings of the Zoological Society*, published a paper on the 'Indian Species of the Genus *Mus*.' Besides examining all the old specimens in the British Museum, Thomas had at his disposal some material recently collected by Blanford in various parts of India, by Mandelli in Sikkim, Colonel St. John in Ajmere and the Rev. Fairbank at Ahmednagar. It is interesting to note that at that date the genus *Mus* included among other genera *Rattus*, *Bandicota* and *Nesokia*.

Two years before the Bombay Natural History Society was founded a memorial signed by Charles Darwin, Sir Joseph Hooker and other eminent men of science was presented to the Secretary of State for India recommending that a series of volumes dealing with the Fauna of British India should be published. This was eventually agreed to and Blanford was appointed editor and in addition undertook to write the volume on mammals which was published between 1888 and 1891. This work was a great advance on that of Jerdon, published some 20 years earlier, but the study of mammals had not advanced in the same way as that of birds had. Although many people in India were interested in the larger animals, few took any interest in squirrels, bats and the like. Furthermore, Blanford, who was working in London, had poor material at his disposal and many of the specimens had been exposed to light in the public galleries. In spite of some shortcomings in descriptions and distribution, for which Blanford was not to blame, this work was of great value to the student in India and was the first authoritative account of the mammals of the Indian Empire.

In 1884 Sterndale brought out his 'Natural History of the Mammalia of India and Ceylon', a popular work which was well received, and the same year saw J. A. Murray's 'Vertebrate Zoology of Sind', a compilation as regards the mammals and birds from Jerdon's works. The author of this last work was at one time in charge of the Frere Museum in Karachi and afterwards of the Victoria and Albert Museum, Bombay.

With the starting of the Society's *Journal* in 1886 a periodical became available where naturalists could record their observations. Among the early contributors there were two eminent Bombay lawyers, J. D. Inverarity a barrister, and Reginald Gilbert a solicitor, both of whom probably knew as much about the habits of big game as they did about the law! Interesting notes on bears and Himalayan game animals were contributed by Major G. S. Rodon, a retired officer of the Royal Scots, who had settled in India and every year spent some

time in Chamba State. Then there was Colonel G. H. Evans of the Burma veterinary service, a popular figure in Rangoon, whose articles on the Thamin, Serow and Goral showed that he was a good observer. For long there had been a dispute as to whether the Gyal was a distinct species or a domesticated form of the Gaur and it was Stuart Baker who settled the question in the fifteenth volume of the *Journal*, but, alas, the four gaur heads which were depicted in the paper never came to the Society!

In 1871 R. C. Wroughton joined the Indian Forest Service and spent nearly the whole of his time in the Bombay Presidency. At first he was interested in Hymenoptera, especially ants, which he deserted for scorpions and through scorpions became acquainted with R. I. Pocock. At that time Pocock was in charge of the collection of Arachnida in the British Museum, but mammals were his real interest and in 1904 he left the Museum and became superintendent of the Zoological Society's gardens. But some time before that he had interested Wroughton in mammals and when the latter came home on leave in 1896 he brought with him a collection of bats which he worked out with Oldfield Thomas's help and wrote a paper 'Some Konkan Bats' in the 12th volume of the *Journal*. When Wroughton retired in 1904 he went to live in London and became a regular worker at the Museum. At first he had to work at African mammals because, as already mentioned, there was no recent Indian material available. He tried, however, to persuade friends in India to collect specimens but with little result, though the Society began to send a small but steady stream of rats, and Colonel Ward's consignments from Kashmir began to appear.

In 1904 Captain Glen Liston, I.M.S., read a paper before the Society on 'Plague, Rats and Fleas' in the course of which he said 'Hankin suggested that the accessibility of people to rats was more important than the filth, overcrowding etc.' He went on to say 'It is absolutely certain that rats are the most important factor in the spread of plague' and finally he added 'what do we know about rats, very little'. The last remark was only too true, and looking back it is extraordinary that nothing was done to properly identify the different species of rats or work out their distribution and biology. It must, however, be remembered that the importance of animals in spreading disease was not yet fully realized. A year after Liston's paper Dr. Hossack of the plague department, Calcutta Municipality, contributed to the *Journal of the Asiatic Society of Bengal* a 'Preliminary Note on the Rats of Calcutta' and this was followed two years later by 'An Account of the Rats of Calcutta with some remarks on the existing class function of the genus *Mus* and *Nesokia*', which was published in the first number of the *Records of the Indian Museum*. There was little new in either of these papers since the author was neither a naturalist nor trained systematist.

Liston's paper, however, encouraged members to send rats to the Society for identification and regular consignments used to arrive from Father Lord of the Cowley Fathers who worked at Pen in the Kolaba district across Bombay Harbour. Many of the specimens were forwarded to Wroughton who, when sending the identifications.

continually urged Millard that the Society should employ a paid collector, but the difficulty was the lack of funds.

At the end of 1911 or beginning of 1912 C. A. Crump suddenly arrived in Bombay and offered his services to the Society. Here was an opportunity not to be missed! Hurriedly calling a meeting of the Committee, Millard persuaded the members to allow him to engage Crump for some months and at the same time issue an appeal for funds. In April Crump started collecting in Khandesh and that was the beginning of the Mammal Survey. In the special Supplement commemorating the Golden Jubilee of the Society (1933) details are given of the money raised, the areas investigated and the forty-six reports issued.

By the next year there were four collectors working, and then in 1914 the war came, the collectors gradually joined up and for a short time the work of the survey came to a standstill. But this was only temporary since, thanks to the assistance of members, the survey went on and one of the Society's assistants was sent to Darjeeling to carry on where Crump had ceased. In 1915 he was moved to Baluchistan to work under Sir Ernest Hotson who had joined the army, and with him also he went to East Persia. R. Shunkara Narayan Pillay, formerly in charge of the Trivandrum Museum, undertook to collect in Travancore, in various parts of Burma J. M. D. Mackenzie of the Forest Service collected in his spare time and Captain Philip Gosse, R.A.M.C., did good work in the Poona district and the Nilgiris. S. H. Prater, then assistant curator of the Society, was sent to work the Satara district and afterwards to North Sind. So it was that the work of the survey was continued all through the first war and soon after peace was declared Mr. Millard engaged another collector to come out from home. Other collectors were recruited in India and Charles McCann, who later succeeded Prater as assistant curator, also went into the field and did good work. In this way the survey carried on till the end of 1923.

During the time the survey was working some 25,000 specimens were collected including all the areas where the old collections of Sykes, Hodgson etc. had been made. The work of sorting and cataloguing this huge series of specimens was carried out in London by R. C. Wroughton assisted by his brother-in-law, T. B. Fry, who carried on the work after Wroughton died in 1921. In addition Wroughton prepared most of the 55 reports and made many contributions to the Scientific Results, besides being responsible for the 'Summary of the Results from the Indian Mammal Survey' the first number of which appeared in Volume 25 of the *Journal*. The Society owes a great deal to these two members for all the work they did, and it must be remembered that neither of them was young at the time.

At the Indian end there was the late Mr. Millard, a very busy man who nevertheless found time to keep the appeal for funds going, engage collectors, arrange where they were to go, supervise the despatch of specimens home etc., to say nothing of editing the *Journal* and looking after his own business. When Mr. Millard left India Sir Reginald Spence took his place and even in the difficult post-war years raised money to keep the survey going.